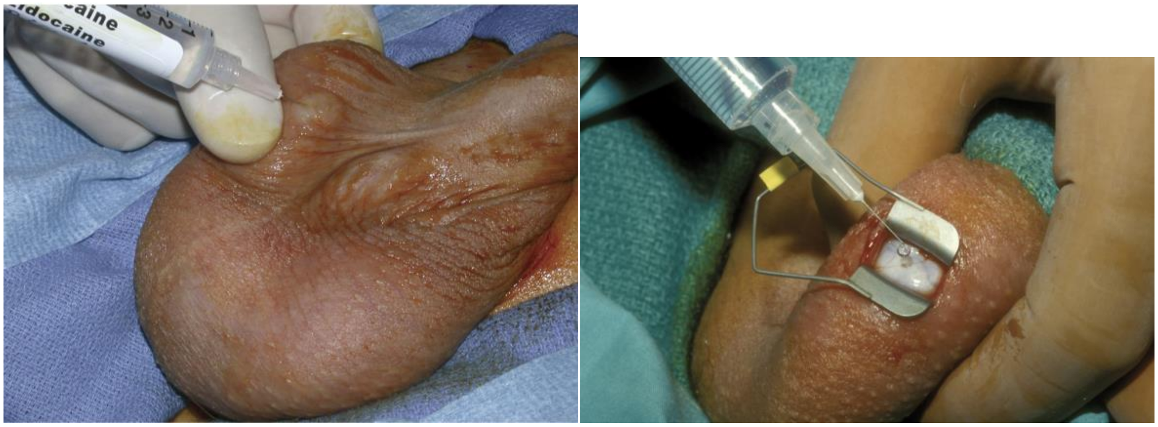
Infertility Surgery

DIAGNOSTIC PROCEDURES

Testicular Biopsy

1. Open Testicular Biopsy (Diagnostic): Surgical Technique
   - spinal, or GA
   - cord block
     - don’t injure testicular artery or cause cord hematoma
     - once the vas is isolated from the cord, 1 mL of a one-to-one mixture of 1% lidocaine HCl and 0.25% bupivacaine is injected in the skin over the vas, and another 1 or 2 mL of the local anesthetic is injected beneath the skin to the area of the vas



Lidocaine HCl (1%) is dripped over the exposed surface of the tunica albuginea before suture placement and incision

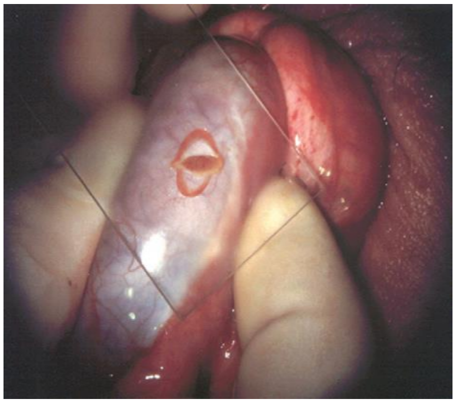
- freeze skin and tunica vaginalis over testis
- 1-2cm incision down to parietal tunica vaginalis
- place 5-0 PDS/prolene at one end of proposed incision site
- 5mm incision into tunica albuginea

- fine iris scissors is used to excise the extruded seminiferous tubules. Forceps are not used to pick up the tissue because they will crush and distort the biopsy specimen

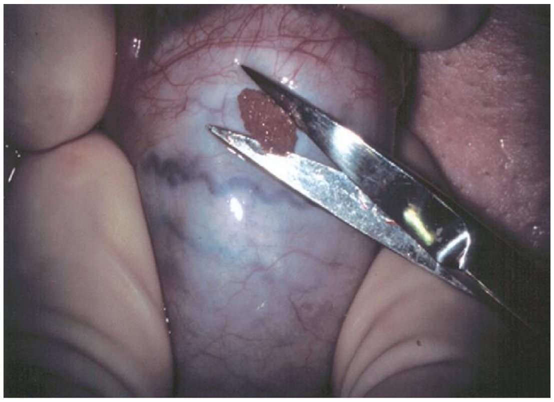
- excise extruded seminiferous tubules with “no touch” technique and place in buffer solution Bouin’s, Zenker’s, or collidine buffered glutaraldehyde } NO formalin

- +/- touch imprint (more predictive) or wet prep
- close tunica albuginea with the 5-0 PDS/prolene on end of incision

- close tunica vaginalis with absorbable (5-0 PDS)
- reapproximate dartos muscle with 2-0 chromic
- subcuticular 4-0 vicryl



touch technique



no-touch technique

2. Percutaneous Testicular Bx
   - local into skin and tunica vaginalis
   - puncture skin with scalpel to prevent inclusion of skin in specimen
   - use prostate Biopty gun and **aim from anterior LP toward UP, slightly lateral**
     - **medial or lateral UP may be best site to do open Bx**

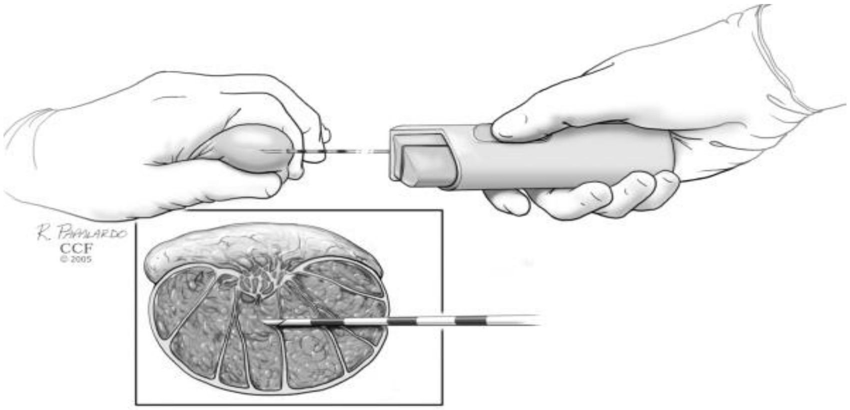


Figure 20-6 Biopsy needle is inserted from the lower pole toward the upper pole, keeping both the epididymis and the su
well away from the point of the needle.

disadvantages of percutaneous testis Bx

- increased risk of injury to testicular artery or epididymis
- fewer seminiferous tubules for examination
- NOT good for pts with previous scrotal surgery with scarring

Complications of testicular Bx

1) bleeding and formation of hematoma (most common)
2) inadvertent Bx of epididymis → **causes obstruction**
3) damage to testicular artery w/ testicular atrophy → 5%
4) inadequate tissue sampling
5) chronic orchalgia

FNA of testis

Advantages

- least invasive technique for sperm retrieval
- least painful
- 21-23 gauge needle used to aspirate at least 3 different sites

disadvantages

- provides only cytologic, NOT histologic, info about testis

PROCEDURES TO IMPROVE SPERM PRODUCTION

Varicocele Repair

different approaches to varicocelectomy

1) scrotal approach
    - historical approach due to high risk of injury to artery & high rate of failure (complex pampiniform plexus)
2) retroperitoneal
    - ligation of internal spermatic vein as it exits inguinal canal with preservation of internal spermatic artery
    - transverse abdo incision at level of internal ring, 2 fingerbreadths medial to ASIS enter retroperitoneum & reflect peritoneum medially to expose internal spermatic vessels
    - **recurrence is common (15%)**
3) lap approach
    - same as retroperitoneal approach
    - rarely used in adults due to invasiveness & because often involves ligation of artery
    - incise peritoneum lateral to spermatic cord and dissect out & ligate testicular vein some advocate ligation of all spermatic vessels b/c testis has other arterial supply
    - recurrence rate <2%
    - hydrocele in 5%
4) inguinal approach
    - 1-4cm oblique incision made just above ext inguinal ring open ext oblique aponeurosis watch out for ilioinguinal nerve mobilize cord and pass Penrose beneath open internal and external spermatic fasciae around cord ligate dilated veins (2-0 silk or clips) but preserve lymphatics + arteries
    - ligate any external cremasteric veins also
5) subinguinal approach
    - 2-3cm transverse incision made over ext inguinal ring
    - identify cord as it exits external ring mobilize cord and pass Penrose beneath open internal and external spermatic fasciae around cord ligate dilated veins including cremasterics
    - less morbidity but more difficult due to increased # of branches

6) percutaneous embolization
7) microsurgical varicocelectomy

   advantages

   - ↓’d rate of post-op hydrocele □ rare vs ~20%
   - ↓’d recurrence rate □ 1-2% vs 9-15%

8) percutaneous embolization of varicoceles

   - performed with either coils, balloons, or sclerotherapy femoral or internal jugular vein
   - higher recurrence rate ~10%
   - particularly useful in recurrent or persistent varicocele (when anatomy needs to be clarified)

complications of varicocelectomy

1) hydrocele
   - from lymphatic obstruction
   - least common with microsurgical approach and embolization
   - **most common with non-microsurgical inguinal**
2) Recurrence
   - **highest with retroperitoneal**, non-microsurgical inguinal, and embolization
   - **lowest with micro inguinal**
3) testicular atrophy
   - uncommon esp after microsurgical (<1%)
4) ilioinguinal nerve injury
5) vas deferens injury
6) infection
7) bleeding/hematoma
8) hernia

f/u after varicocelectomy

- S/A at 4/12 post-op
- observe semen for 1yr post-op } if persistent or recurrent Vx then can re-operate or embolize

PROCEDURES TO IMPROVE SPERM DELIVERY

Vasectomy & Vasectomy Reversal

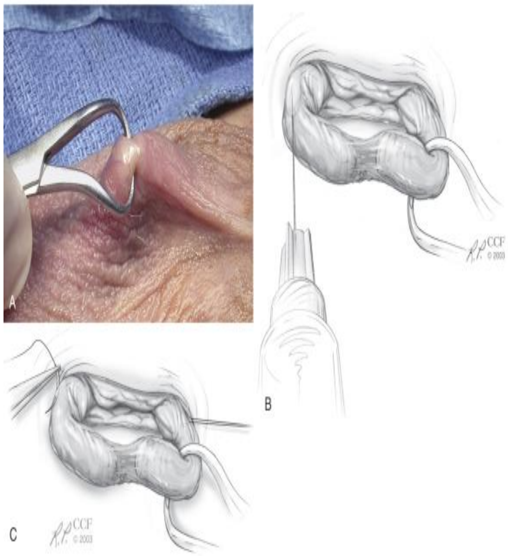
approaches to performing a vasectomy

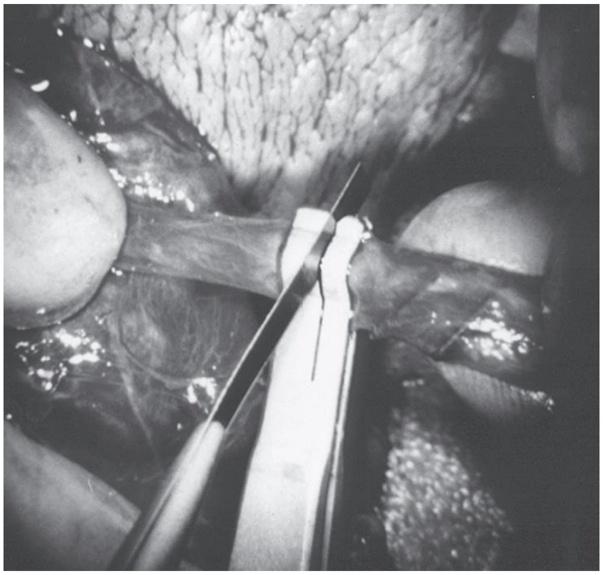
1) conventional incision
    - bilateral transverse incisions or midline raphe incision
    - leave incisions open to prevent hematoma
2) no-scalpel vasectomy “The least invasive and least complication “
    - pull vas to midline and grasp with vas clamp
    - sharp curved mosquito used to split skin, then spread to expose vas
    - once vas free, clamp with mosquito and mobilize
    - place clips and divide
    - replace vas ends, coagulate edges of dartos layer and leave split skin
3) percutaneous vasectomy
    - chemical occlusion with cyanoacronate and phenol
    - place Congo red in R vas, methylene blue in L vas
        i. - urine post-op should be brown
        ii. - if urine red, right missed; if urine blue, left missed
4) High-frequency U/S vasectomy
5) Laparoscopic vasectomy combined with intra-abdo procedure (eg hernia repair)
6) open-ended vasectomy high failure rate but ↓’s epididymal obstruction b/c no pressure

*** contraception until 2 negative S/A’s at 3 months, 4 weeks apart ***

main points of a vasectomy

- isolate vas from spermatic cord vessels and bring to skin
- local anesthetic injected into skin and within peri-vasal sheath injection of a mixture of 0.5% bupivacaine and 1% lidocaine into the distal perivasal sheath
- vas delivered into incision
- deferential artery, veins, and accompanying nerves are dissected free of vas and spared
- segment of vas removed
- ends are clipped or tied +/- cauterized +/- intraluminal cautery
    - The most effective occlusion technique is cauterisation of the lumen of the vas deferens and fascial interposition as it **decrease recanalization rates**
- hemostasis + close





complications following vasectomy

☐ **less common with no-scalpel technique**

☐ early

- hematoma (most common – 2%)
- infection
- injury to testis, epididymis
- sperm granuloma its presence indicate
    - higher risk of recanalization
    - less epididymal & testicular damage
    - higher VV success

☐ long-term

- **chronic testicular or epididymal pain } 1 in 1000**
- altered testicular function
- testicular atrophy (cord injury)
- 2nd epididymal obstruction it is time related it limits vasectomy reversal. If secondary epididymal obstruction occurs, tubulovasostomy is needed to reverse the vasectomy
- anti-sperm Ab's } detectable levels found in 60-80%
- failed vasectomy (recanulization - <1%)
    - Presence of of MOTILE sperm at 3 months post-vasectomy most will need repeat vasectomy
    - non-motile sperm post-vasectomy not a failure continue to use contraception until repeat S/A and encourage more ejaculations
- vasitis nodosa (just a histologic dx, no pathology)
- ?PCa risk } likely a detection/referral bias

vasectomy is not associated with any serious, long-term, side effects (atherosclerosis , any systemic disease, and increase prostate cancer incidence).

Management post-vasectomy pain syndrome

☐ presents w/ orchialgia, pain w/ intercourse, pain w/ ejaculation, pain on exertion, tender epididymis

☐ occurs 1 in 1000

- microsurgical denervation
- vas reversal
- open-ended vasectomy
- epididymectomy

Vasectomy reversal 5 % seek reversal

Factor affecting vasectomy reversal,

- the time between vasectomy and re-fertilisation, the longer the interval is from vasectomy to reversal, the lower is the pregnancy rate.
- type of vasectomy (e.g., open-ended or sealed),
- type of reversal (vasovasostomy or vasoepididymostomy),
- whether reversal was unilateral or bilateral.
- Macrosurgical or Microsurgical techniques.

Microsurgical vasectomy reversal is a low-risk and (cost-) effective method of restoring fertility.

For couples wanting to achieve pregnancy, sperm aspiration together with ICSI is a second-line option for selected cases and in those with failed vasovasostomy

work-up prior to vasectomy reversal

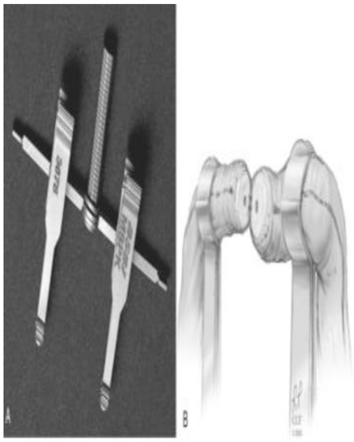
- Hx and P/E } assess gap
  } assess testis size
  } look for evidence of sperm granuloma
- women to see gyne

principles of vas reconstructive surgery

1) mobilize both ends to prevent tension on anastomosis
2) preserve peri-vasal adventitia to keep arterial supply intact
3) precise approximation of cut lumens in watertight fashion

Vaso vasostomy

- upper scrotal incision through dartos and then create sub-dartos pouch bluntly
- isolate and deliver vas with vas clamp then free vas without stripping perivasal adventitia
- locate vas on lateral side for VV (medial side for VE)
- identify healthy vas proximal and distal to vasectomy/obstruction
- cut vas with sharp blade after placing 5-0 PDS/prolene stay suture~1cm from cut site
- identify sperm from testicular vas +/- saline vasogram of abdominal vas or formal vasography to ensure patency
- place vas clamp to approximate 2 ends
- close in 3 layer fashion (10-0 mucosa, 9-0 muscularis and adventitia)
- tie stay sutures on either end together to decrease tension on anastomosis



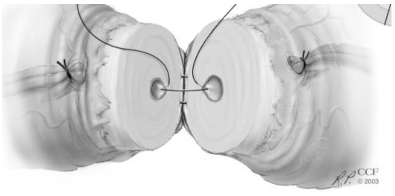


Figure 20-21 First mucosal suture placed at 6-o'clock position.

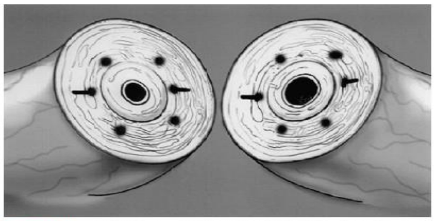
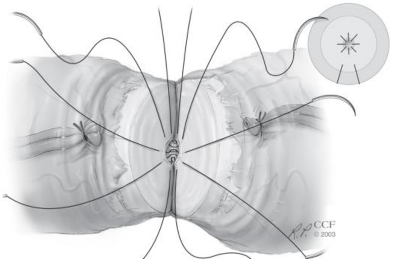


Figure 22–16. The abdominal end of the vas is marked in the same way to exactly match the testicular end.



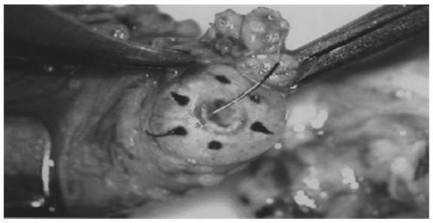


Figure 22–17. Double-armed sutures allow inside-out placement.

Maneuvers can be done to gain additional vasal length

- separate vas from cord structures
- blunt finger dissection through external ring to free vas to internal ring
- dissect entire convoluted vas off attachments to epididymal tunica gains 4-8cm
- dissect epididymis off testis gains 4-8cm
- cut floor of inguinal canal and reroute vas under floor
- transposition of testis if crossed VV

f/u post-VV

- no heavy exertion for 2-3 weeks
- S/A in 1/12 then q3/12 } sperm usually seen 1-3 months post-VV
  } if no sperm by 6/12 then considered a failure

potential complications of VV

1) bleeding and hematoma
2) infection
3) 2° obstruction after successful VV (3-12%)
4) sperm granuloma

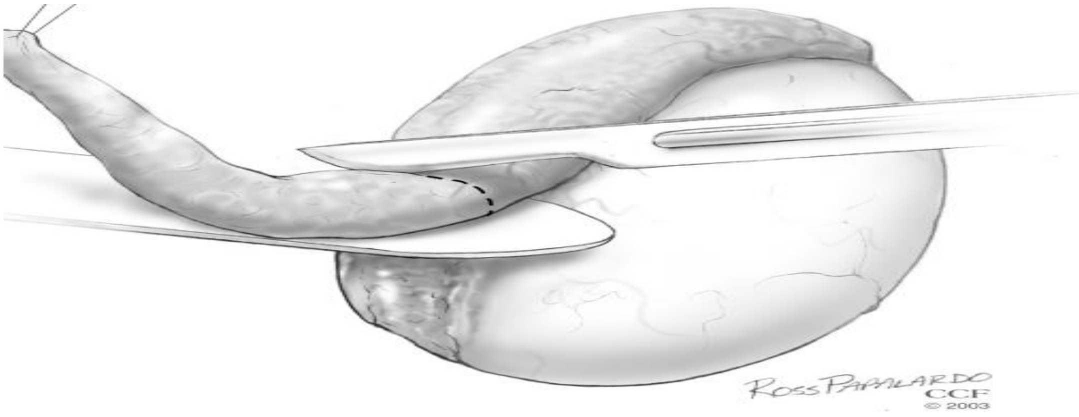
Vasoepididymostomy

Indication = obstruction of testicular vas or epididymis

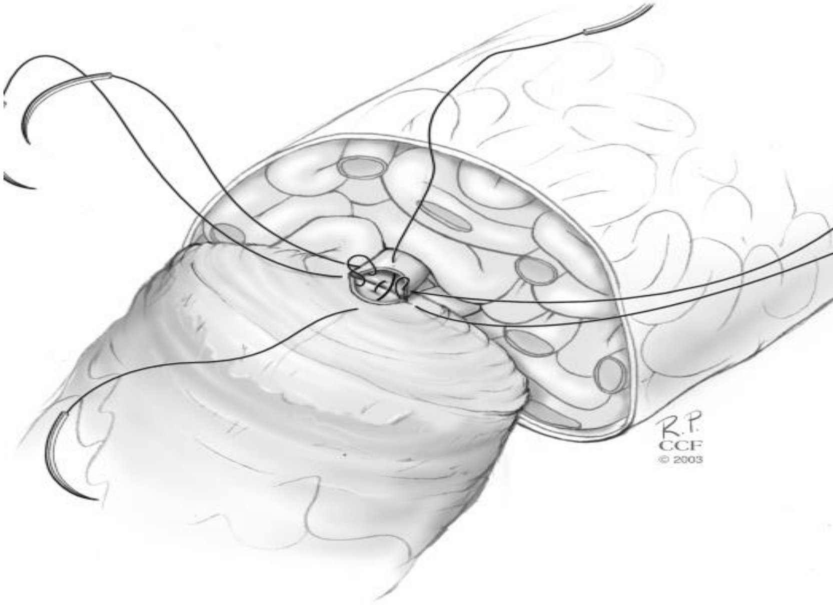
1) prolonged period of obstruction vasectomy >15yrs ago due to developed 2° obstruction of epididymis
2) fluid from testicular vas is thick, pasty and devoid of sperm
3) fluid from testicular vas is creamy and contains debris and few sperm heads
   (if few sperm heads/sperm parts, NOW CONSIDERED OK to do VV)
4) no fluid from testicular vas
5) irrigation of proximal vas fails to wash out sperm

Technique of microsurgical VE

1) end-to-end
   - best for distal obstruction b/c tubule is larger & wall thicker in tail
2) end-to-side “direct vs intussuscepted”
   - less dissection
   - less bleeding b/c epididymis not transected
   - anastomosis made within tunica vaginalis



: Transection of the tail of the epididymis in preparation for an end-to-end vasoepididymostomy.



igure 20-37 The sutures at the 3-, 12-, and 9-o'clock positions are all placed, then tied to approximate the lu

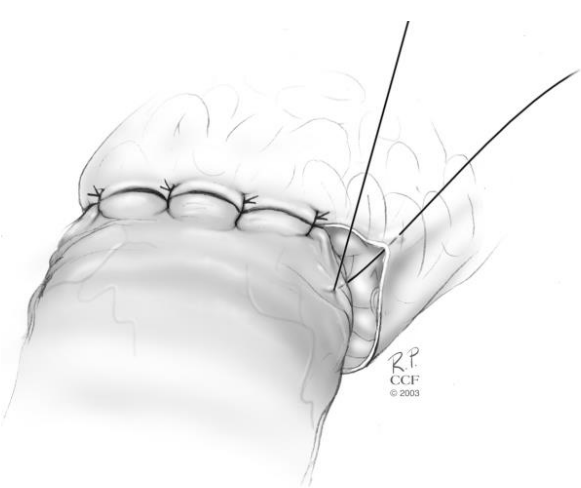
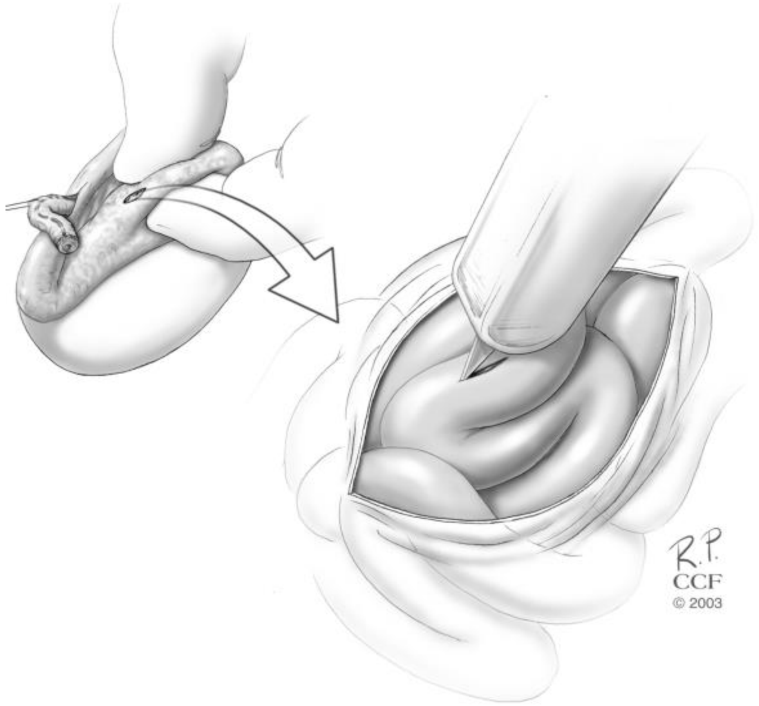
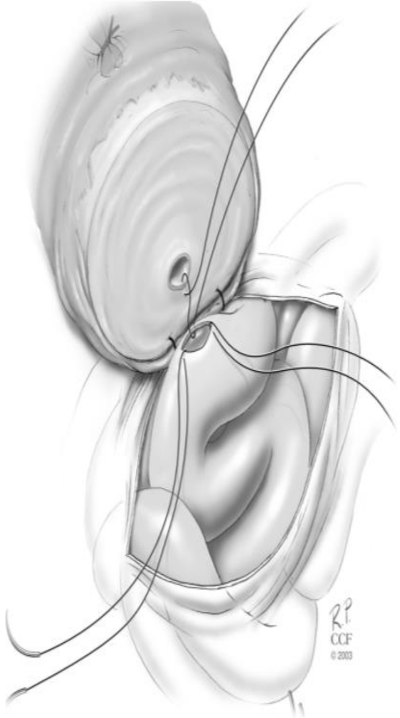
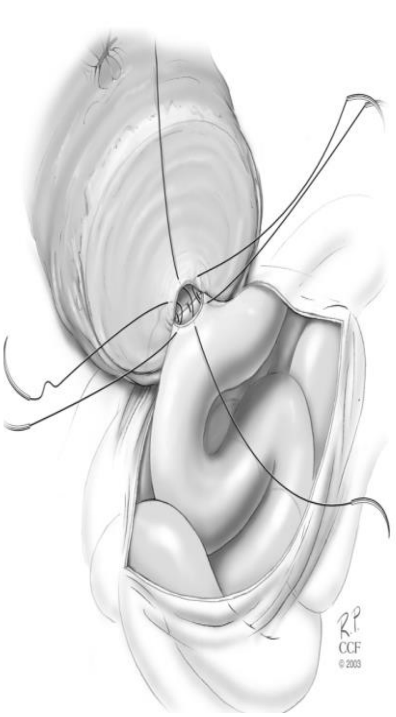


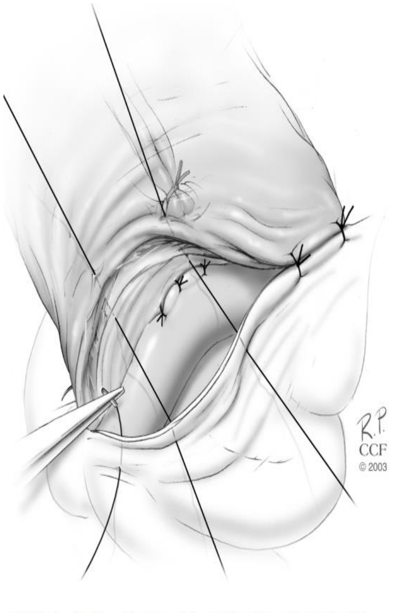
Figure 20-38 The adventitia and muscularis of the vas are approximated to the epididymal tunic.

end to end VA anastomosis



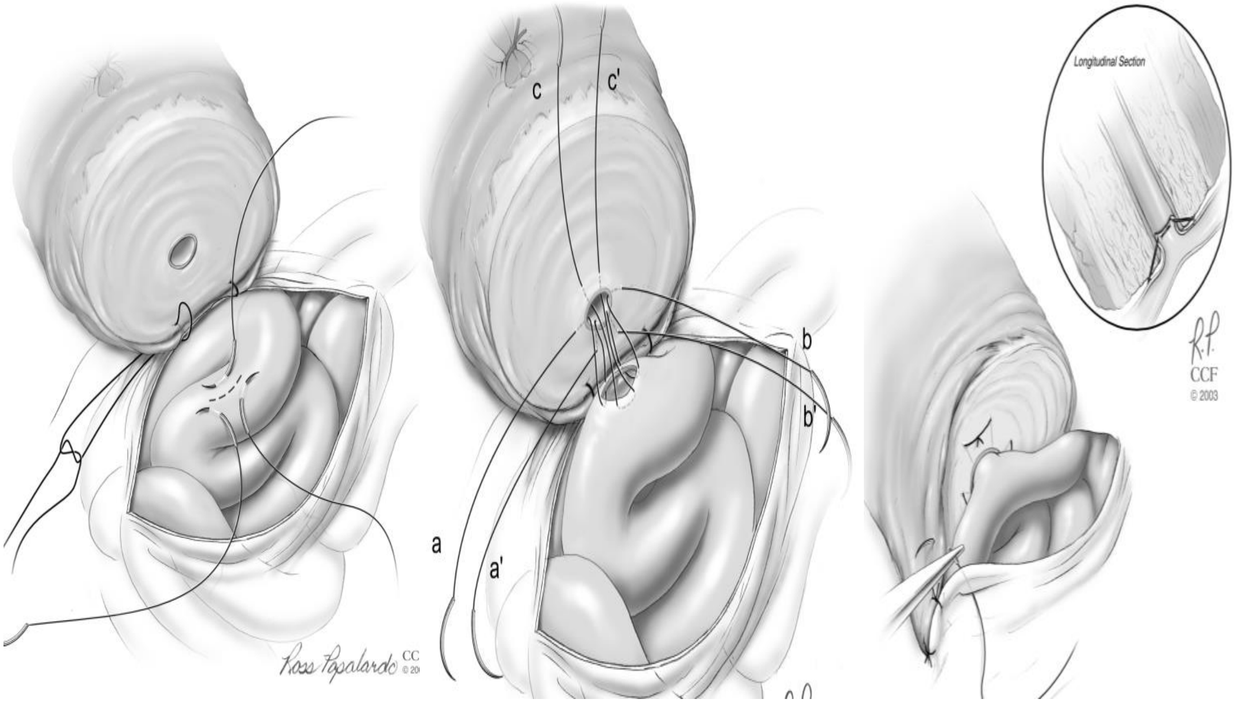






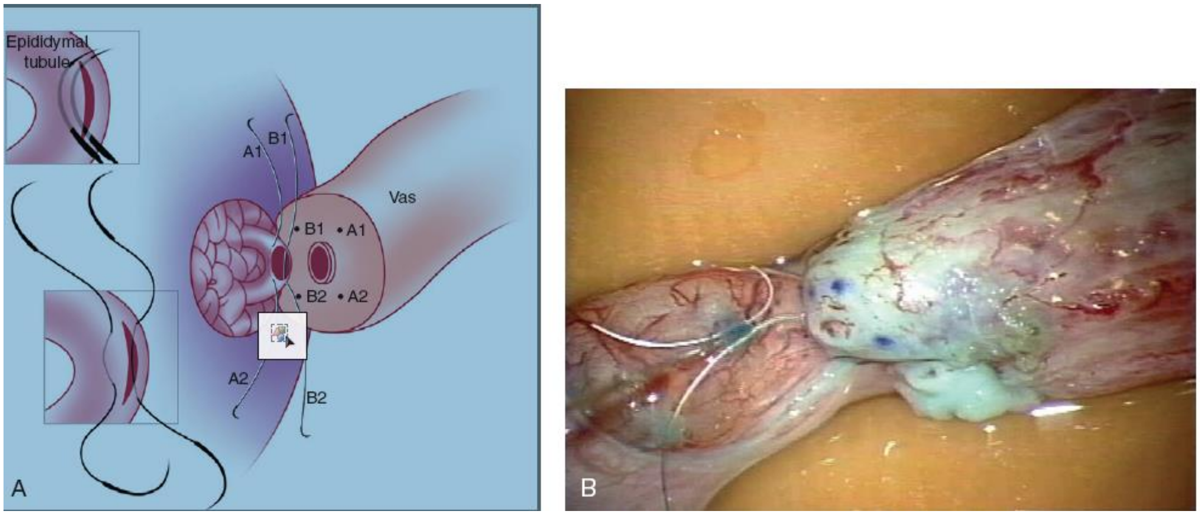
e 20-45 The adventitia and muscularis are secured to the edge of the window made in the epididymal tunic.

End to side



end-to-side intussusception

1- Placement of the three needles 2- The double-armed sutures are passed through the vas lumen 3- When the sutures are tied, the epididymal lumen gets pulled into the lumen of the vas, and then the muscularis and adventitia can be closed



The two-suture method of intussuscepting the epididymal tubule into the vas lumen is a bit simpler than the three-suture technique

Describe a VE.

- GA or epidural anesthesia)
- vertical incision made in upper scrotum over each testis
    - can be extended into groin if more extensive mobilization of vas required
- can do open testis Bx if required +/- deliver testicle
- isolate vas on lateral side of cord for VE (medial for VV)
- vasostomy made at junction of straight and convoluted vas
- check distal lumen for patency saline vasogram
- check testicular vas for fluid
- proximal end ligated or cauterized
- stay suture placed on distal vas (5-0 PDS/prolene)
- mobilize but don’t strip vas from cord
- once adequate length obtained, microscope brought in
- anastomosis made at most distal, patent portion of epididymis
- different methods of anastomosis

complications of a VE

- infection
- hematoma
- failed reconstruction
- testicular artery injury +/- testicular atrophy
- DVT from prolonged Sx

success rates of VE

- depends on
    - technique used
    - level of obstruction
    - age and reproductive capacity of female
    - surgeon skill
- ~75-80% patency rates
- ~40% pregnancy rates

predictors of successful VV/VE

1) **patient factors**

- obstruction <3yrs
- med/surg hx post-vasectomy
- prior fertility
- presence of sperm granuloma
- long testicular remnant length
- good quality sperm of vasal fluid
- watery fluid at vasectomy site

2)partner factors

- prior fertility
- age <35yrs

SPERM RETRIEVAL 2)

1) Vasal Aspiration of sperm

- use local anesthesia (esp if normal sensation eg anejaculation 2° to DM or MS)
- hemitransect anterior wall of vas and aspirate fluid from testicular vas
- once adequate sperm obtained (confirm on micro) then vas closed with interrupted 9-0 suture
- sperm can be used for IUI or frozen for IVF/ICSI at later date

2) Epididymal Aspiration of sperm

indication of epididymal aspiration of sperm

1) prior vasectomy with no wish for reversal
2) CBAVD

epididymal sperm aspiration **taken from head of epididymis**

1) percutaneous (PESA)
    - for fresh or frozen IVF/ICSI
    - quick, inexpensive
    - can get insufficient sperm for cryo esp if there's minimal dilation of head of epididymis
    - use local for cord block and skin
    - 25 gauge needle for aspiration

2) open microsurgical (MESA)
    - for fresh or frozen IVF/ICSI
    - requires OR, expensive
    - enables surgeon to collect large # of motile sperm for cryo
    - open epididymal tunic & dilated tubule
    - 24 gauge angiocath used to aspirate fluid
    - 10-0 used to close tubule, 9-0 for tunic
    - ~60% pregnancy rates

3) Open Testis Bx

*** Bx can be diagnostic and therapeutic where sperm is extracted for fresh or frozen IVF/ICSI ***
*** now mainly combined with therapeutic options *

4) Testis Sperm Aspiration and Needle Bx (TESA)

less invasive than MESA but less sperm retrieved

PROS	CONS
- percutaneous under local (20 gauge) - cheap	- can have inadequate sperm collection - may not aspirate from best tubules - often needs multiple Bx/aspirations

5) TESE Testicular sperm extraction

non-microsurgical TESE

- can take multiple mini-Bx specimens, being cautious to avoid major vessels and making only horizontal incisions into tunica albuginea
- 5-0 used to close

microTESE

- for non-obstructive azoospermia
- allows more meticulous opening of tunica albuginea, avoiding cutting across vessels critical to testis
- less tissue needs to be extracted and so more of testis is preserved
- higher rate of sperm retrieval for use with ICSI
- ~50% chance of finding sperm, 30% pregnancy rate
- technique
  - testis delivered into field and under microscope horizontal (Schlegel) or vertical (Jarvi) incison made into tunica albuginea
  - hemostasis of all small vessels at edge
  - large, dilated, yellowish tubules sampled and examined on wet prep for sperm

vasography is performed by

- fine needle vasography technically difficult (30 gauge angiocath needle)
   hard to get sufficient vasal sperm for cryo
- open vasostomy testis delivered via high scrotal incision
   incise vasal sheath longitudinally to preserve vasal vessels
   hemitransect vas
   check testicular vas for fluid and sperm to r/o proximal obstruction
   check first w/ saline vasography } if easy & no resistance, no need for contrast
   use only indigo carmine } DO NOT USE methylene blue (impairs sperm motility)
   Foley placed to identify BN } air in balloon
   dye seen in urine confirms patency
   can also pass 1-0 prolene to measuresie of obstruction

complications of vasography

 more common with fine needle vasography

- hematoma
- stricture
- sperm granuloma
- vascular injury to vas deferens